

Evaluation of the associations between airborne real-time concentrations of black carbon and fine particulate matter (PM_{2.5}) in urban hotspots of South Korea

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Black carbon (BC) is an important constituent of fine particulate matter (PM_{2.5}) because of its known carcinogenic effects on human health. Recently, PM_{2.5} and Black carbon has been used as index contaminants of Diesel Emission. We conducted this study to assess the association of real-time PM_{2.5} with Black Carbon concentrations among urban hotspot sites in South Korea.

Real-time PM_{2.5} and BC measurements were conducted using real-time portable monitors of SidePak AM510 personal Aerosol Monitor (TSI Inc., St. Paul, MN)¹ and MicroAeth Model AE51 equipped 2.5µm microcyclone (Magee Scientific, Berkeley, CA)², respectively. We measured their concentrations twice per day, between 8 a.m. and 10 a.m.; between 6 p.m. and 8 p.m. to capture the morning and afternoon distributions of these pollutants during the daily rush-hour period. We selected eight sampling sites: bus terminals, highway tollgates and intersections with high volume traffics in Seoul metropolitan city and Cheonan, South Korea.

Seasonal comparison of PM_{2.5} and BC concentration levels showed that winter season concentrations were higher than those in summer season; PM_{2.5} was 2.2 time and BC was 1.6 times. The proportion of BC to PM_{2.5} concentration in summer was higher than winter season; 10~38% in winter measurements, and 16~68% in summer measurements. Our study also provides compelling evidence of positive associations of RT PM_{2.5} counts with BC concentrations.